

# Dual Fuel – A Lease Use Approach

Laredo Natural Gas Workshop

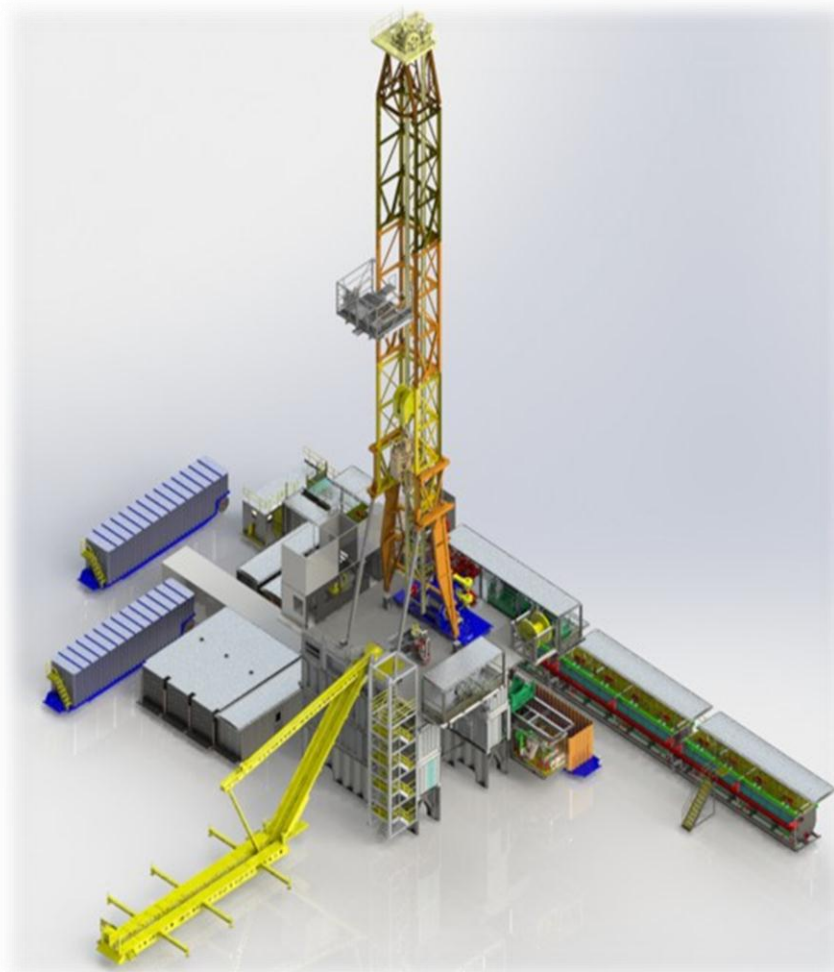
April 17, 2014



**Marathon Oil®**

# Dual Fuel Concept

- Substitute Natural Gas for Diesel Fuel
  - Economics
    - Diesel is ~10x the cost of natural gas on an MMBTU (energy-equivalent) basis.
    - Large spend category
  - Environmental Stewardship
    - Emissions Reduction
    - Trucking Reduction
  - Explore and Test Technology to advance Marathon's Eagle Ford Operations



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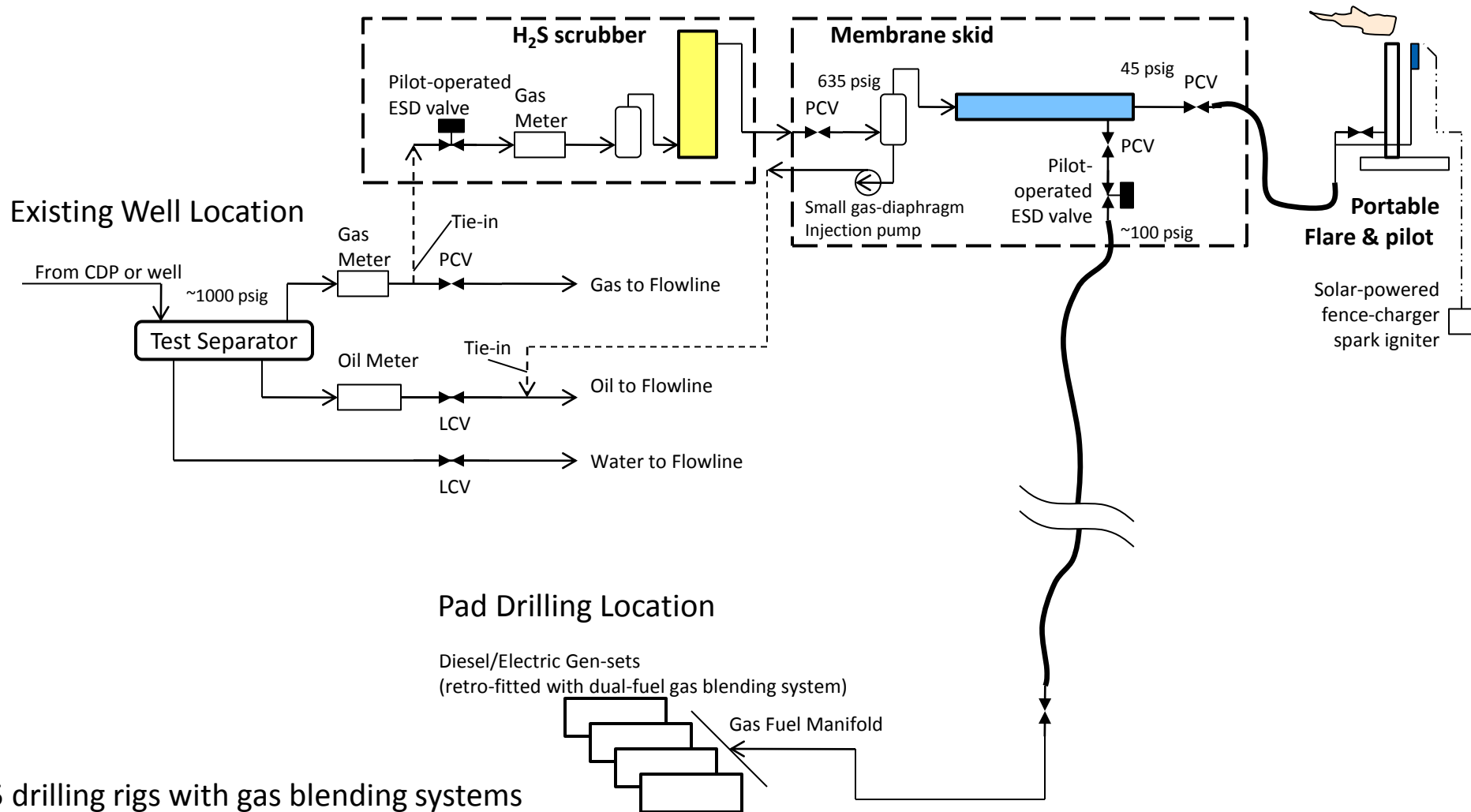
## *Considerations and Challenges*

- Land
  - Lease Terms
  - Permits
  - Pipeline Route
- Internal Communication
  - Division Order, Land, Law, Accounting, Measurement, Drilling, and Regulatory
- Safety
- Supply
- Rig Schedule
- Economics



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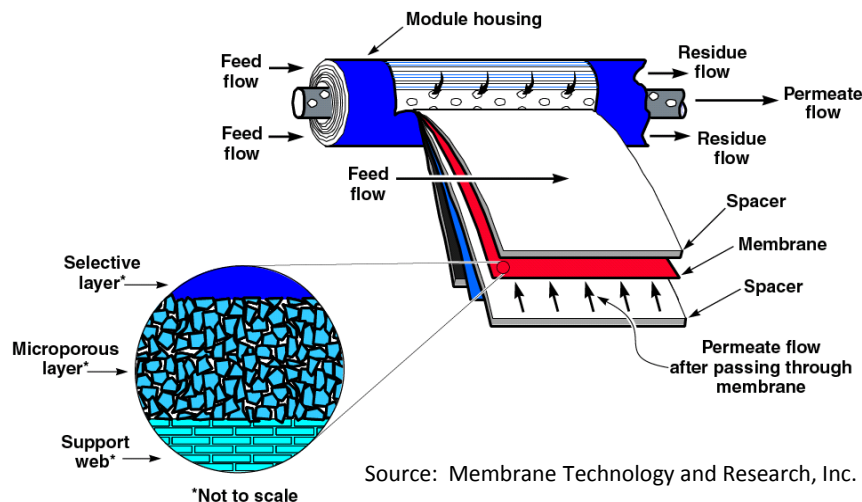
## Implementation Concept



5 drilling rigs with gas blending systems  
4 membrane skids  
8 months from concept to pilot

# Dual Fuel

## Membrane Technology

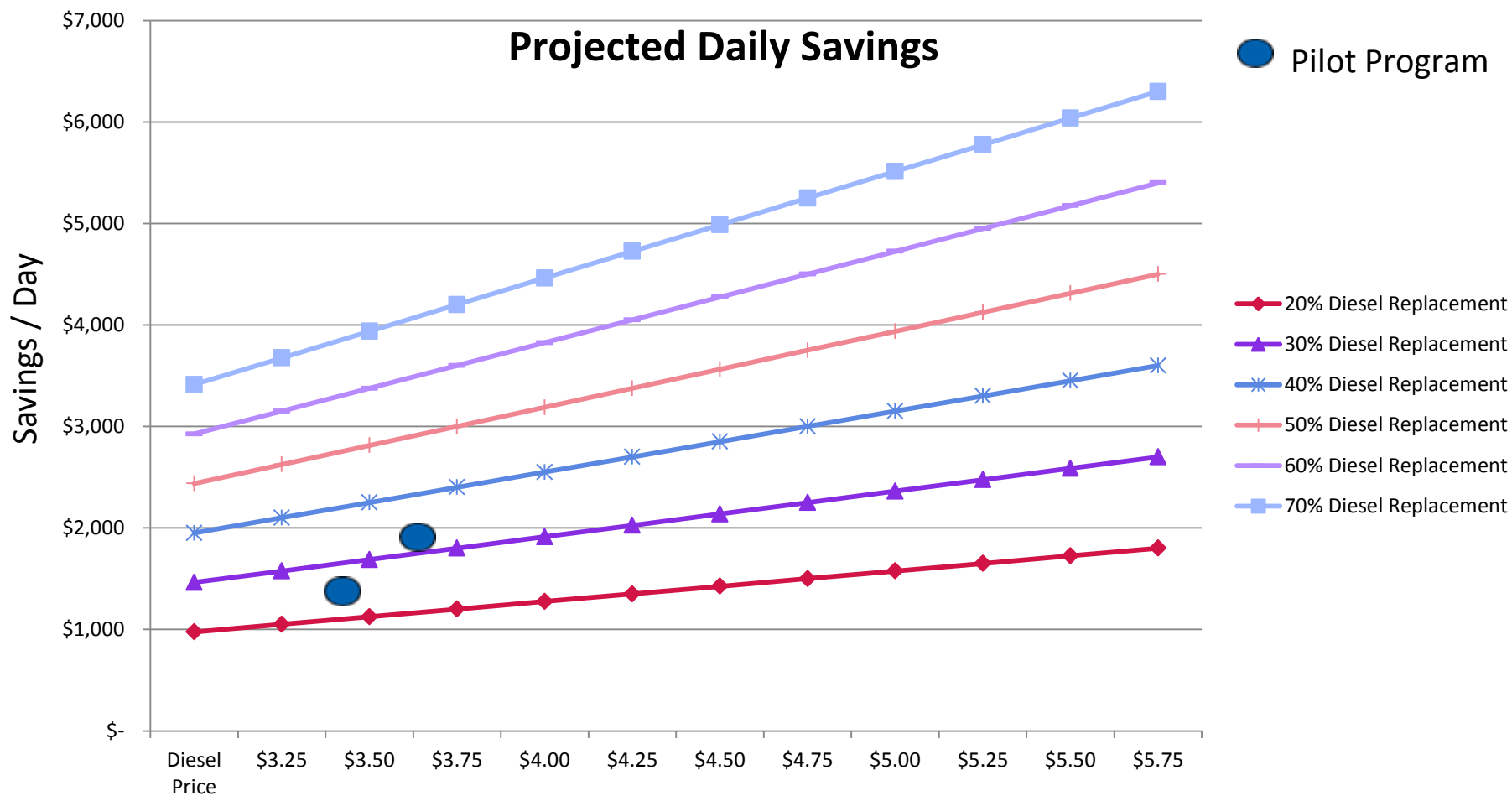


Membrane Skid

- Pressurized gas provides the driving force for heavy component permeation
- Passive operation with 99% reliability
- Operates at ambient temperature
- No upstream dehydration required
- Heavy components removed from gas are contained in a low pressure “permeate” vapor stream
- Combust permeate stream or recycle if location is near a central facility

# Dual Fuel

## Fuel Savings



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## Questions?

